

A REVIEW OF THE CHINESE PSECHRIDAE (ARANEAE)

Xin-Ping Wang: Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118 USA

Chang-Min Yin: Hunan Biological Institute, Hunan Teachers University, Changsha, Hunan 410008 China

ABSTRACT. The Chinese psechrid spiders of the genera *Fecenia* and *Psechrus* are reviewed. The species *Fecenia hainanensis* is newly synonymized with *F. cylindrata*. The species *P. mimus* is considered a nomen dubium. The species *P. senoculata* is regarded as a valid species. The male is newly described for *P. tingpingensis*. Three new species are described: *P. jinggangensis* new species, *P. rani* new species, and *P. taiwanensis* new species. In all, nine psechrid species are recognized from China. The spinnerets, trichobothria, and tarsal organ morphology of *P. tingpingensis* are presented. A key to Chinese *Psechrus* species is also provided.

Keywords: Psechridae, *Psechrus*, *Fecenia*, China

Psechrid species of the genera *Fecenia* Simon 1887 and *Psechrus* Thorell 1878 are widespread from China (north to Qinling Mt., Shaanxi) and southeast Asia to New Guinea, with approximately 19 valid species (Platnick 2000). A revision of this family was presented by Levi (1982), who gave detailed diagnoses, illustrations, and descriptions of the family, genera, and species. Levi's revision (1982) enabled further work on the species of this family possible (e.g., Murphy 1986; Yin, Wang & Zhang 1985). To date, seven psechrid species have been reported from China (Song, Zhu & Chen 1999): *P. ghecuanus* Thorell 1897; *P. kunmingensis* Yin, Wang & Zhang 1985; *P. minus* Chamberlin 1924; *P. sinensis* Berland & Berland 1914; *P. tingpingensis* Yin, Wang & Zhang 1985; *Fecenia cylindrata* Thorell 1895; and *F. hainanensis* Wang 1990. The presence of *P. torvus* (O. P.-Cambridge 1869) in Taiwan (Lee 1966; Hu 1984) was shown to be a misidentification (Chen 1996; Song, Zhu & Chen 1999).

Further collection and study of Chinese psechrids made this revision possible. In this paper, nine psechrid species are recognized from China. The species *Fecenia hainanensis* is newly synonymized with *F. cylindrata*. The species *P. mimus*, which was described

based on an unidentifiable juvenile female (Chamberlin 1924), is considered a nomen dubium, and therefore the species *P. senoculata* is removed from its synonymy. The male is newly described for *P. tingpingensis*. The female previously identified as *P. sinensis* by Levi (1982) is shown to be a new species. Three new species described in this study are: *P. jinggangensis*; *P. rani*; and *P. taiwanensis*.

METHODS

All measurements are in mm. All scales are 0.2 mm length. Leg measurements are shown as: total length (femur, patella + tibia, metatarsus, tarsus). The terms used in the genitalic descriptions follow Levi (1982). Because of the similar body color pattern, stable number of cheliceral teeth, and similar leg spine distributional pattern at species-level, the species descriptions are focused on the male and female genitalic structures. The material used in this study was based on collections made available through the courtesy of the following individuals and institutions: N.I. Platnick, American Museum of Natural History, New York, USA (AMNH); J. Margerison, The Natural History Museum, London, UK (BMNH); C.M. Yin, Hunan Biological Institute, Changsha, Hunan, China (HBI);

M.S. Zhu, Hebei Teachers University, Shijiazhuang, China (HTU); J. Chen, Institute of Zoology, Beijing, China (IZB); P. Pantini, Museo de Bergamo, Bergamo, Italy (MCB); C. Rollard, Museum National d'Histoire Naturelle, Paris, France (MNHN).

SPINNERETS, TRICHOBOTHRIA AND TARSAL ORGAN MORPHOLOGY

A representative species, *Psechrus tingpingensis*, was chosen here for detailed spinnerets, trichobothria, and tarsal organ descriptions in order to form a basis for further comparison with other psechrids and also with other families in future study. This species was selected for the reason of well-preserved spinnerets in the examined psechrid species and large numbers of available specimens.

Cribellum large, divided, female with numerous spigots (Figs. 39, 40), male without spigots (Fig. 41). According to a study by Zhang et al. (1998) of the female juvenile cribellum of *P. mimus* (sensu Zhang et al. 1998), "there was still not any spigot visible

on the seventh day of molting; there were few small spigots in the middle area of cribellum on the ninth day of molting, and many spigots appeared on the eleventh day juveniles but still no distinct segment." Apex of anterior lateral spinneret (ALS) with two major ampullate spigots (MAP) at mesal margins, many short piriform spigots in both male and female; posterior median spinneret (PMS) strongly curved back anteriorly (Fig. 36), with spigots situated on distal half of the segment, one minor ampullate spigots (mAP) on distal end, 40–50 aciniform spigots in both male and female, and 11–12 cylindrical spigots (as shown in short arrows) in female arranged in two rows; posterior lateral spinneret (PLS) with approximately 30 aciniform spigots in both male and female, and at least 16 cylindrical spigots (as shown in short arrows) in female (Figs. 42–47). Trichobothrial base with hood transversely striated (Fig. 37). Tarsal organ oval to round (Fig. 38), situated dorsally on distal tarsus, slightly anterior of most distal trichobothrium.

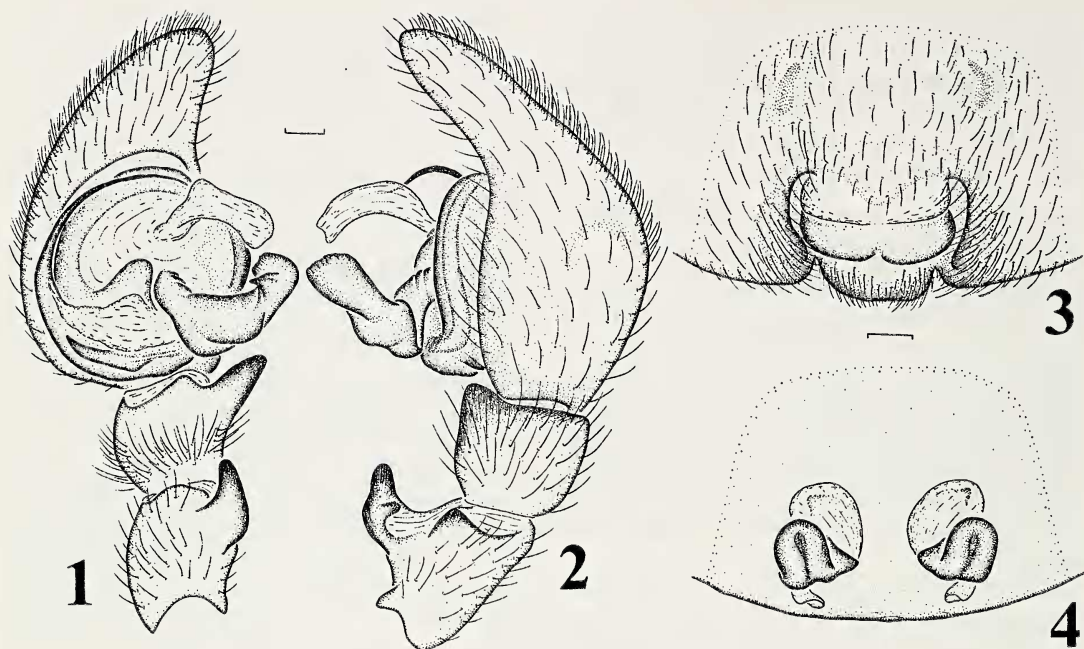
KEYS TO CHINESE *PSECHRUS* SPECIES

Males

1. Palpal femur modified with notch (Figs. 21, 26, 33) 2
Palpal femur without such modification 4
2. Conductor base enlarged, with small tubercles (Fig. 19) *senoculata*
Conductor base not enlarged, without tubercles 3
3. Embolic base with 2 teeth (Figs. 31, 32) *tingpingensis*
Embolic base with only 1 tooth (Figs. 24, 25) *sinensis*
4. Embolus short, much shorter than the bulb length (Figs. 5, 6) *ghecuanus*
Embolus long, at least the bulb length (Figs. 13, 14) *rani* new species

Females

1. Ventral abdomen with distinct white spot in front of cribellum 2
Ventral abdomen without distinct white spot in front of cribellum 7
2. Epigynum with slits more or less parallel (Fig. 29) *taiwanensis* new species
Epigynum otherwise (Figs. 9, 11, 22, 27, 34) 3
3. Epigynal median sclerite lobed on sides, spermathecal heads situated laterad of spermathecae (Figs. 9, 10) *kunmingensis*
Epigynal median sclerite not lobed, spermathecal heads situated mesad of spermathecae (Figs. 11, 12, 22, 23, 27, 28, 34, 35) 4
4. Slits of epigynum wider apart anteriorly than posteriorly (Figs. 11, 22) 5
Slits of epigynum wider apart posteriorly than anteriorly (Figs. 27, 34) 6
5. Posterior copulatory ducts much larger than spermathecae (Fig. 23) *senoculata*
Posterior copulatory ducts much smaller than spermathecae (Fig. 12) *jinggangensis* new species
6. Anterior epigynum strongly narrowed, width approximately $\frac{1}{4}$ of posterior (Fig. 27) *sinensis*
Anterior epigynum moderately narrowed, width at least $\frac{1}{2}$ of posterior (Fig. 34) *tingpingensis*
7. Spermathecal heads situated mesad of spermathecae (Fig. 16) *rani* new species
Spermathecal heads situated anterad of spermathecae (Fig. 8) *ghecuanus*



Figures 1–4.—*Fecenia cylindrata*. 1. Male palp, ventral view; 2. Male palp, retrolateral view; 3. Epigynum; 4. Vulva.

TAXONOMY

Fecenia cylindrata Thorell

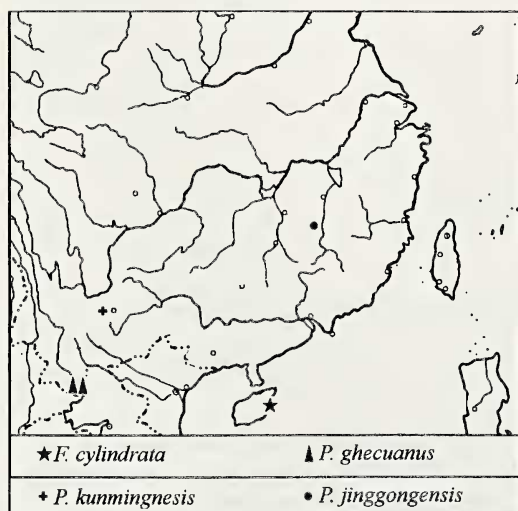
Figs. 1–4, Map 1

Fecenia cylindrata Thorell 1895: 64 (1 juv. syntype from Tharrawaddy, Myanmar, in Naturhistoriska Riksmuseet, Stockholm, examined by Levi

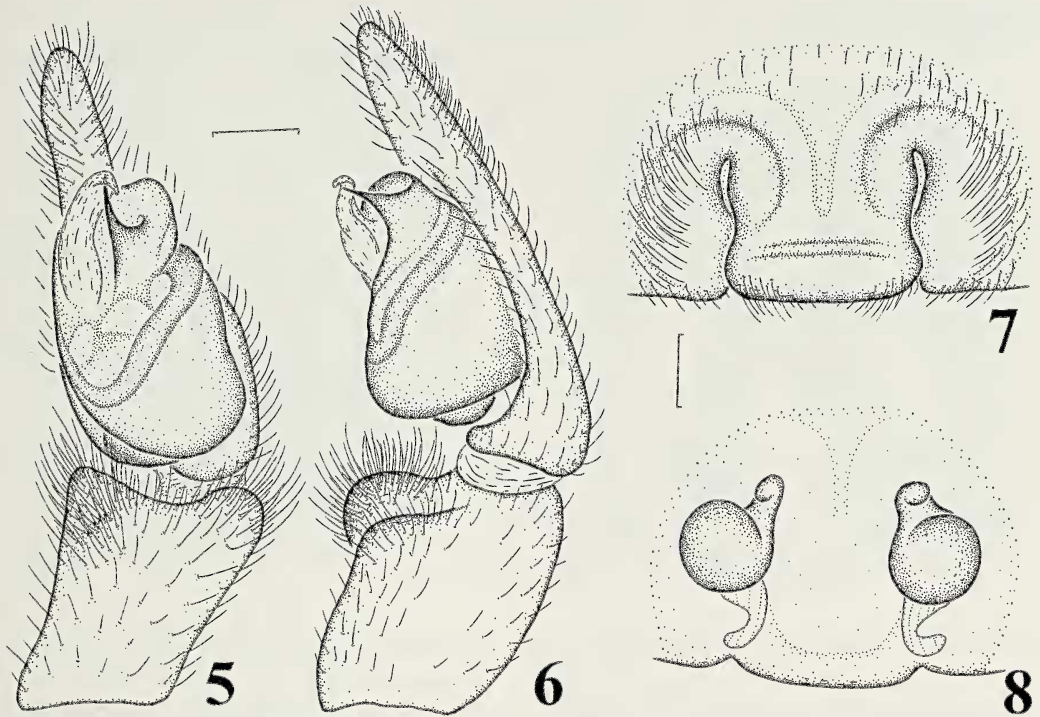
1982). Thorell 1897: 263; Pocock 1900: 212; Lehtinen 1967: 462, figs. 472, 473 (male); Levi 1982: 136, figs. 80–82 (male and female); Yang & Wang 1993: 29, figs. 1–4 (male and female); Song, Zhu & Chen 1999: 397, fig. 2310-Q (male and female).

Fecenia hainanensis Wang 1990: 257, figs. 1–3 (female holotype from Tongqian City, Hainan, China, in HBI, examined). Song, Zhu & Chen 1999: 397. NEW SYNONYMY.

Synonymy.—This species was erroneously described as *F. hainanensis* with one female specimen from Hainan, China. The only difference between *F. hainanensis* and *F. cylindrata*, according to Wang (1990), was the presence of a pair of long, oval, white spots on ventral abdomen. Apparently, such spots are present in *F. cylindrata* and other *Fecenia* species (Levi 1982). Later collection of *F. cylindrata* with both males and females from the same locality (Yang & Wang 1993) further showed that *F. hainanensis* is in fact a junior synonym of *F. cylindrata*. The species *F. cylindrata* was collected from Tongqian and Qionghai, Hainan, China (Wang 1990; Yang & Wang 1993). It is widespread and occurs in large numbers in Qionghai (Yang & Wang 1993).



Map 1.—Distribution of *Fecenia cylindrata*, *Psechrus ghecuanus*, *P. kunningensis* and *P. jinggongensis* new species in China.



Figures 5–8.—*Psechrus ghecuanus*. 5. Male palp, ventral view; 6. Male palp, retrolateral view; 7. Epigynum; 8. Vulva.

Diagnosis.—This species can be distinguished from others by the presence of a median depression on the epigynum, and by the shape and transverse direction of the median apophysis (Figs. 1–4).

Description.—See Thorell (1895), Levi (1982) and Wang (1990).

Material examined.—CHINA: Hainan: Jianfeng, 6 August 1990, 1 male and 1 female (M.B. Gu, HTU); Tongqian, 1 July 1984, female holotype of *F. hainanensis* Wang 1990 (M.Y. Liu, HBI).

Distribution.—China (Hainan) (Map 1), Myanmar.

Psechrus ghecuanus Thorell
Figs. 5–8; Map 1

Psechrus ghecuanus Thorell 1897: 261 (female syntypes from Myanmar, in Naturhistoriska Riksmuseet, Stockholm, examined by Levi 1982); Levi 1982: 123, figs. 29–33 (female); Yin, Wang & Zhang 1985: 19, fig. 1 (A–I) (male and female); Song, Zhu & Chen 1999: 397, figs. 232A–B, M–N (male and female).

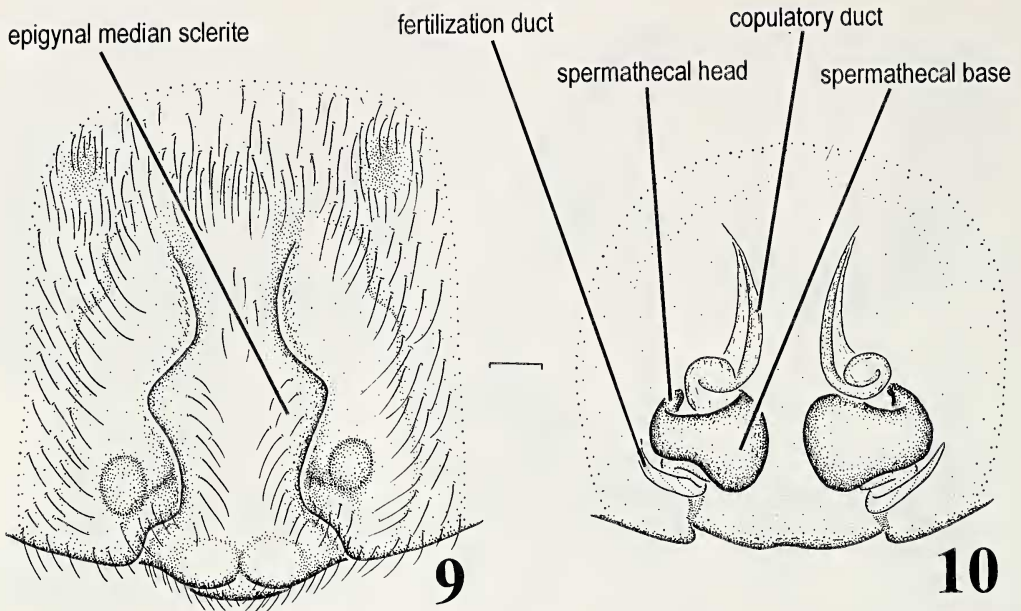
Diagnosis.—This species is similar to *P. torvus* but can be distinguished by the short

embolus, the simple embolic base (Figs. 5, 6), and the more or less parallel epigynal slits (Figs. 7, 8).

Male.—See description of Yin, Wang & Zhang (1985). White spot in front of cribellum absent. Male palpal femur without modification; palpal bulb duct more or less strongly curved, U-shaped; conductor long, lamella shaped; embolus short, slender; embolic base simple, not rectangular, but slightly triangular (Figs. 5, 6).

Female.—See descriptions of Thorell (1897), Levi (1982), and Yin, Wang & Zhang (1985). White spot in front of cribellum absent. Epigynal slits more or less parallel; epigynal median sclerite wide, width about $1.25 \times$ length; copulatory ducts short, not distinct; spermathecal heads apparent, situated anteriorly; spermathecae rounded, large, widely separated (Figs. 7, 8).

Material examined.—CHINA: Yunnan: Mengla, 21 March 1978, 1 male and 1 female (J.F. Wang, HBI); Menglun, 31 July 1981, 2 females (J.F. Wang, HBI); Menghai, 23 March 1978, 1 male and 1 female (J.F. Wang, HBI).



Figures 9, 10.—*Psechrus kunmingensis*, female. 9. Epigynum; 10. Vulva.

Distribution.—China (Yunnan) (Map 1), India, Thailand, Myanmar.

Psechrus kunmingensis Yin, Wang & Zhang
Figs. 9, 10; Map 1

Psechrus kunmingensis Yin, Wang & Zhang 1985: 25, fig. 5(A-D) (female holotype and 3 female paratypes from Kunming, Yunnan, China, in HBI, examined). Song, Zhu & Chen 1999: 397, figs. 232C-D, O-P (male and female).

Psechrus tingpingensis: Feng 1990: 34, fig. 9 (female only) (misidentification).

Diagnosis.—This species can be easily distinguished by the laterally lobed epigynal median sclerite, the lateral placement of the spermathecal heads, the shape of spermathecae (Figs. 9, 10) and the presence of strong apophyses at embolic base.

Female.—Described by Yin, Wang & Zhang (1985). White spot in front of cribellum present. Epigynal slits not parallel; epigynal median sclerite elongated, with lateral margins lobed; copulatory ducts long, distinct, widely separated; spermathecal heads apparent, situated laterally, curved anteriorly; spermathecae transversely extended, large, widely separated (Figs. 9, 10).

Male.—Illustrated by Song, Zhu & Chen (1999), but not described. The male specimens are not available in this study. Judging from the illustrations by Song, Zhu & Chen

(1999), male palpal bulb duct only slightly U-shaped; conductor long, lamella shaped; embolus short, slender; embolic base with strong apophyses (figs. 232O-P in Song, Zhu & Chen 1999).

Material examined.—CHINA: Yunnan: Kunming, 5 April 1979, female holotype (J.F. Wang, HBI); Kunming, July 1983, 2 female paratypes (M.Y. Liu, HBI); Kunming, 21 July 1981, 4 females (J.F. Wang, HBI); Kunming, 30 June 1999, 1 female (X. Xu, HBI).

Distribution.—China (Yunnan) (Map 1).

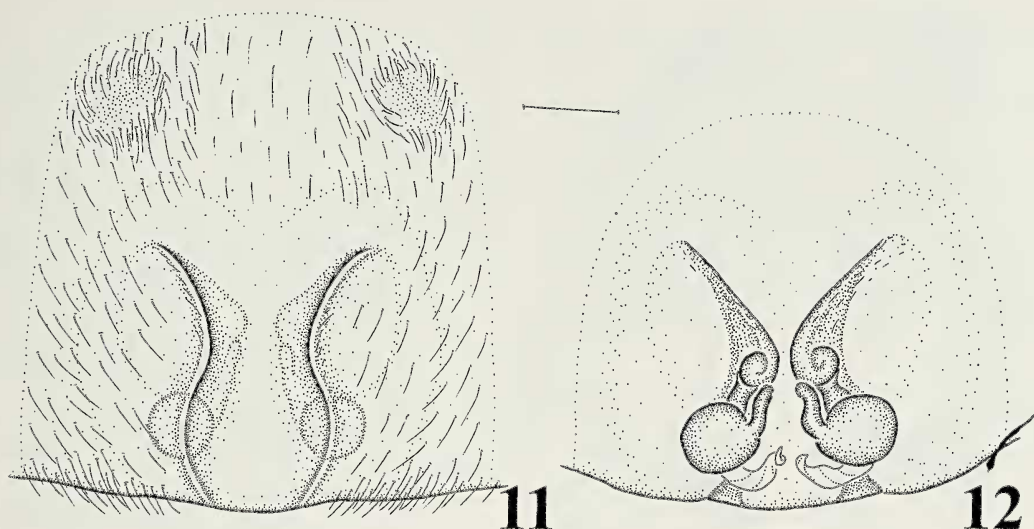
Psechrus jinggangensis new species
Figs. 11, 12; Map 1

Types.—Female holotype from Jinggangshan (N26.5E114.1), Jiangxi, China (4 October 1996; C.M. Yin), deposited in HBI.

Etymology.—The specific name refers to the type locality.

Diagnosis.—This species is similar to *P. kunmingensis* but can be distinguished by the laterally concave epigynal median sclerite, the rounded spermathecae, and the mesal placement of the spermathecal heads (Figs. 11, 12).

Female.—Total length 24.5. Carapace 9.0 long, 7.8 wide. Abdomen 15.5 long, 9.0 wide. Leg measurements: I: 63.2 (18.5, 22.2, 15.1, 7.4); II: 47.3 (13.0, 16.5, 12.0, 5.8); III: 33.5 (10.0, 10.5, 8.5, 4.5); IV: 46.0 (14.0, 15.5,



Figures 11, 12.—*Psechrus jinggangensis*, female. 11. Epigynum; 12. Vulva.

11.0, 5.5). White spot in front of cribellum present. Epigynal slits not parallel; epigynal median sclerite elongated, with lateral margins concave; copulatory ducts widely separated anteriorly, approaching each other posteriorly; spermathecal heads apparent, situated mesally; spermathecae rounded, widely separated (Figs. 11, 12).

Male.—Unknown.

Other material examined.—None.

Distribution.—China (Jiangxi) (Map 1).

Psechrus rani new species

Figs. 13–18; Map 2

Types.—Male holotype from Sanchahe, Maolan National Nature Reserve, Libo, Guizhou, China (6 October 1997; X.P. Wang); female paratype from Xiaoqikong, Libo, Guizhou, China (2 March 1995; J.C. Ran), deposited in IZB.

Etymology.—The specific name is a patronym in honor of Mr. Jing-Cheng Ran of the research department, Maolan National Natural Reserve, Guizhou, China, the collector of the paratype female.

Notes.—The male and female are matched because their localities are close together and also the similar size.

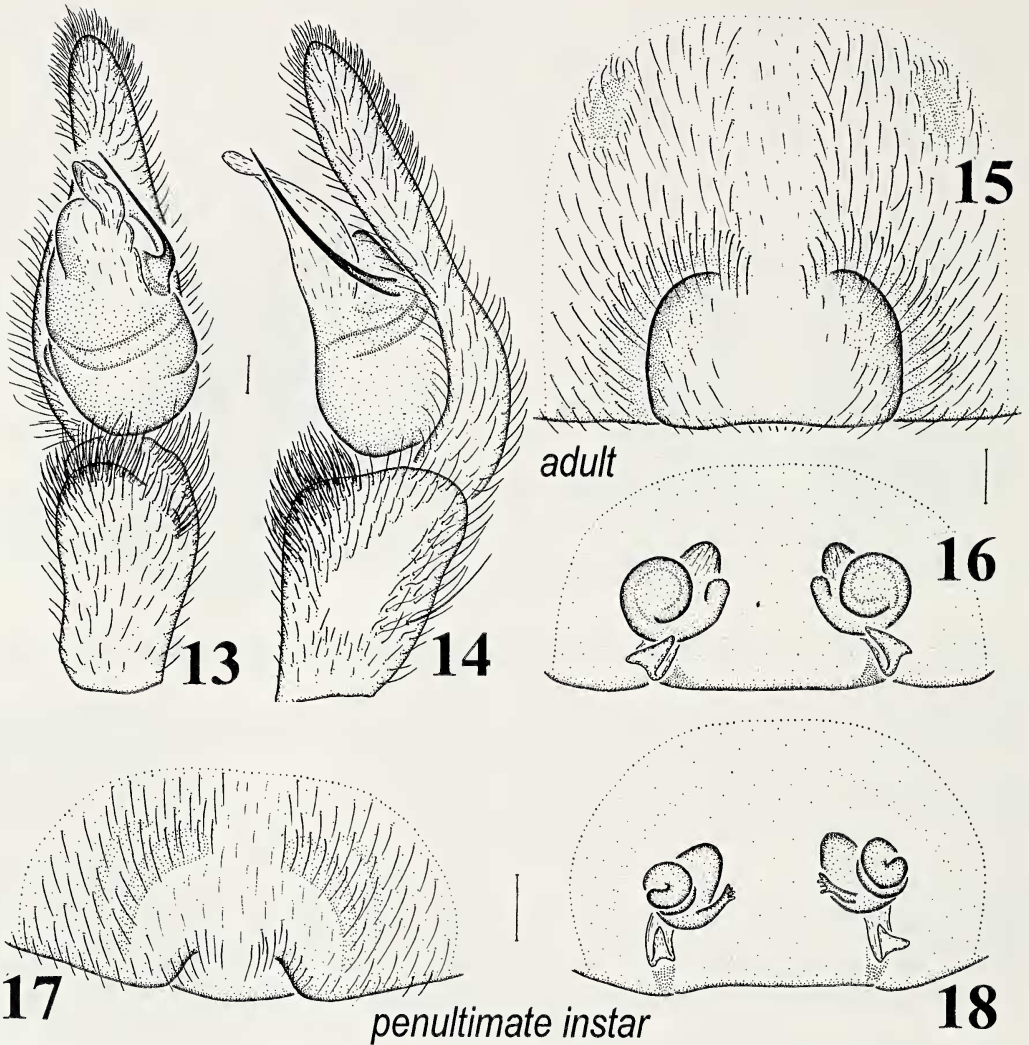
Diagnosis.—This new species seems closest to *P. torvus* but can be distinguished by the simple, small embolic base, the enlarged conductor base (Figs. 13, 14), and the more or less parallel lateral margins of epigynal me-

dian sclerite, and the shape of spermathecae (Figs. 15, 16).

Male.—Total length 18.0. Carapace 7.2 long, 5.6 wide. Abdomen 10.8 long, 4.8 wide. Leg measurements: I: 69.6 (18.4, 23.2, 19.2, 8.8); II: 53.4 (14.4, 18.0, 14.0, 7.0); III: 33.6 (9.6, 11.2, 9.2, 3.6); IV: 54.8 (15.2, 17.0, 15.0, 7.6). White spot in front of cribellum absent. Male palpal femur without modification; palpal bulb duct simply curved, slightly U-shaped; conductor long, lamella shaped, with enlarged base; embolus long, slender; embolic base simple, small, not rectangular (Figs. 13, 14).

Female.—Total length 21.6. Carapace 8.0 long, 6.0 wide. Abdomen 13.6 long, 8.0 wide. Leg measurements: I: 54.8 (14.8, 18.4, 14.4, 7.2); II: 44.2 (12.4, 15.2, 11.0, 5.6); III: 31.2 (9.2, 9.6, 8.0, 4.4); IV: 46.2 (12.8, 14.4, 12.0, 7.0). White spot in front of cribellum absent. Epigynal slits more or less parallel; epigynal median sclerite with lateral margins wide apart medially, posteriorly, approaching each other anteriorly; width of epigynal median sclerite approximately 1.5× length; copulatory ducts short but clearly visible; spermathecal heads apparent, short, situated mesally; spermathecae rounded, widely separated (Figs. 15, 16).

Penultimate instar.—As indicated by Levi (1982), some sclerotized sculpturing occurs in the genital area in the penultimate instar. In



Figures 13–18.—*Psechrus rani* new species. 13. Male palp, ventral view; 14. Male palp, retrolateral view; 15. Epigynum; 16. Vulva; 17. Penultimate instar, epigynum; 18. Penultimate instar, vulva.

the penultimate instar, the epigynum and vulva (Figs. 17, 18) are clearly apparent and may be confused with adults stage (Figs. 15, 16), if no adults are collected and compared with it. Compared to the adult stage, the longitudinal grooves of the epigynum of the penultimate instar are much shorter and not well developed, and the spermathecae and spermathecal heads are weaker, although the copulatory ducts and fertilization ducts are as well developed as the adult stage. Perhaps this is one reason why the psechrid female genitalia appear so variable. According to our collection of *P. senoculata* from various places in China, including Shaanxi, Hubei, Sichuan,

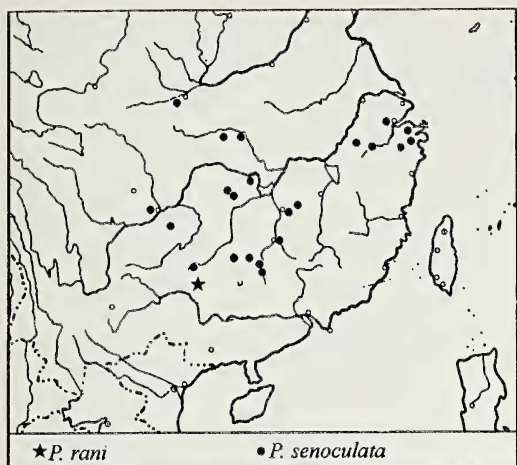
Hubei, Hunan, and Guizhou Province, all adult female genitalia are stable, particularly the vulva.

Other material examined.—CHINA: Guizhou: Libo, Maolan National Nature Reserve, Yaozai, 7 October 1997, 1 female penultimate instar (X.P. Wang, IZB).

Distribution.—China (Guizhou) (Map 2).

Psechrus senoculata Yin, Wang & Zhang
Figs. 19–23; Map. 2

Psechrus mimus: Xu & Wang 1983: 35, figs. 1–7 (male and female); Song 1987: 68, figs. 34A–D (male and female); Song 1988: 33; Chen & Zhang 1991: 40, fig. 31 (male and female); Zhang



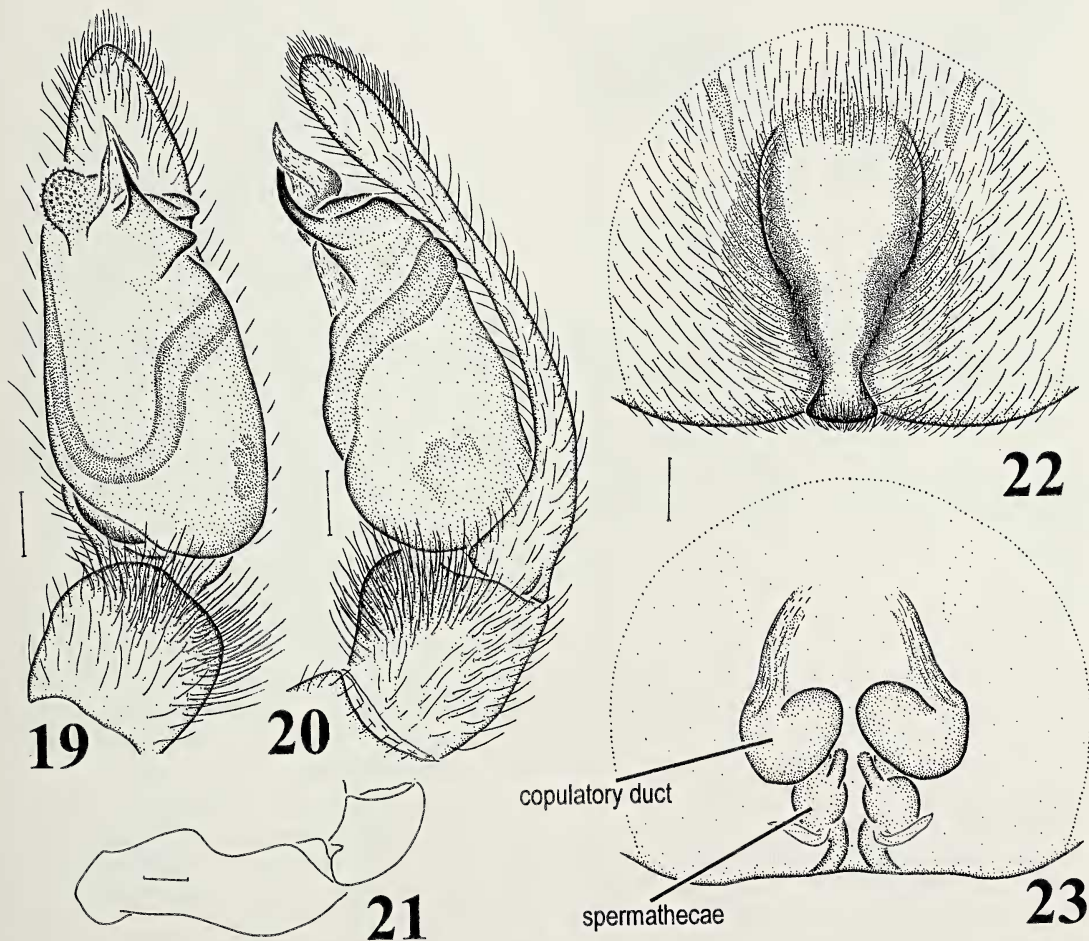
Map 2.—Distribution of *Psechrus rani* new species and *P. senoculata* in China.

et al. 1998: 77, figs. 2a-p (female); Song, Zhu & Chen 1999: 397, figs. 232E-F, Q-R, Pl. 3C (female) (misidentification).

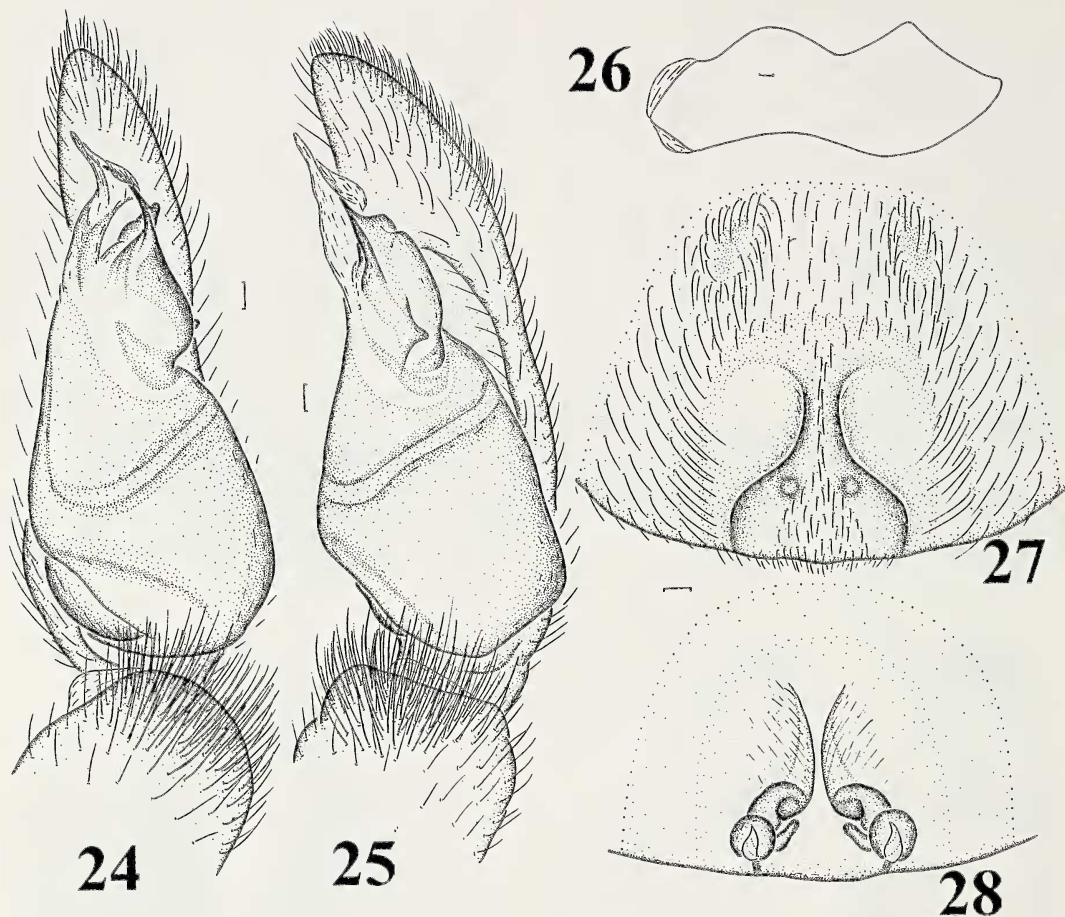
Psechrus sinensis: Hu 1984: 55, fig. 50 (male and female); Chen & Gao 1990: 25, figs. 27a-b (male and female) (misidentification).

Psechrus senoculata Yin, Wang & Zhang 1985: 21, fig. 2(A-J) (female holotype from Sangzhi, Hunan, male allotype from Zhangjiajian, Daiyong, Hunan, and 1 male and 1 female paratypes from Huanglongdong, Hangzhou, Zhejiang, China, in HBI, examined. Feng 1990: 33, fig. 8 (male and female).

Synonymy.—The species *P. senoculata* has been treated as a junior synonym of either *P. mimus* (Song 1988) or identified as *P. sinensis* (see Hu 1984; Chen & Gao 1990). Chamberlin (1924) described *P. mimus* from an unidentifiable female juvenile from Su-



Figures 19–23.—*Psechrus senoculata*. 19. Male palp, ventral view; 20. Male palp, retrolateral view; 21. Male palpal femur, showing femoral modification; 22. Epigynum; 23. Vulva.



Figures 24–28.—*Psechrus sinensis*. 24. Male palp, ventral view; 25. Male palp, retrolateral view; 26. Male palpal femur, showing femoral modification; 27. Epigynum; 28. Vulva.

zhou, Jiangsu, China and should be considered as *nomen dubium*. Further study of the types of *P. sinensis* (two male syntypes from Guiyang, Guizhou, China, in MNHN, examined) showed that *P. senoculata* is a valid species rather than the synonym of *P. sinensis*.

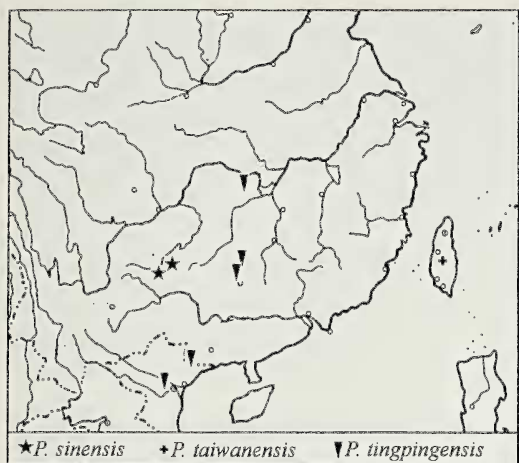
Diagnosis.—This species can be easily distinguished from *P. sinensis* by the elongated, vase-shaped, anteriorly wider epigynal median sclerite (Fig. 22), the large, strongly expanded posterior part of copulatory ducts (Fig. 23), and the strongly enlarged, tuberculous conductor base (Fig. 19).

Male.—Described by Yin, Wang & Zhang (1985) and Song (1987). White spot in front of cribellum present. Palpal femur modified with notch (Fig. 21); palpal bulb duct U-shaped; conductor short, lamella shaped; conductor base strongly enlarged, with numerous

small tubercles; embolus short, slender, with rectangular base (Figs. 19–21).

Female.—Described by Yin, Wang & Zhang (1985) and Song (1987). White spot in front of cribellum present. Epigynal slits wider apart anteriorly than posteriorly; epigynal median sclerite vase-shaped; copulatory ducts with posterior part enlarged, extending anteriorly; spermathecal heads apparent; spermathecae rounded, relatively small, close to each other (Figs. 22, 23).

Material examined.—CHINA: *Hunan*: Sangzhi, 21 August 1984, female holotype (Y.J. Zhang, HBI); Daiyong, Zhangjiajian, 20 September 1984, male allotype (Y.J. Zhang, HBI); Chengbu, July 1982, 2 females (X.C. Ouyang, HBI); Liuyang, Mt. Dawei, 31 July 1994, 1 female (H.M. Yan, HBI); Changsha, Lukou, 30 June 1999, 1 female (Xu, HBI); Daoxian, 9 October 1991, 1 male (L.S. Gong,



Map 3.—Distribution of *Psechrus sinensis*, *P. taiwanensis* new species, and *P. tingpingensis* in China and Vietnam.

HBI); Shimen, Mt. Huping, 25 June–7 July 1992, 1 female (X.J. Peng, HBI); Suining, 25 May 1995, 2 females (C.M. Yin & Y.J. Zhang, HBI); Hengyang, Mt. Goulou (elev. 1500 m), 30 July 1997, 1 female (X.J. Peng, HBI); Shuangpai, 11 August 1993, 1 female (C.M. Yin, HBI). *Hubei*: Wudangshan, from Zixiao to Nanya, 23 September 1997, 1 male and 4 females (X.P. Wang, AMNH); Xiangyang, October 1990, 1 male and 3 females (J.F. Wang, HBI). *Guizhou*: Kaili, 3 October 1997, 1 male and 1 female (X.P. Wang, MCB); Zunyi, 22 September 1997, 1 female (X.P. Wang, AMNH). *Sichuan*: Chongqing, Jingyunshan, 26 September 1997, 1 female (X.P. Wang, AMNH). *Zhejiang*: Hangzhou, Huanglongdong, 16 May 1982, 1 male and 1 female paratypes (Z.F. Chen, HBI). *Shaanxi*: Zhouzhi, Louguantai, June 1990, 1 male and 1 female (X.P. Wang, AMNH).

Distribution.—China (Hunan, Zhejiang, Hubei, Guizhou, Sichuan, Shaanxi) (Map 2).

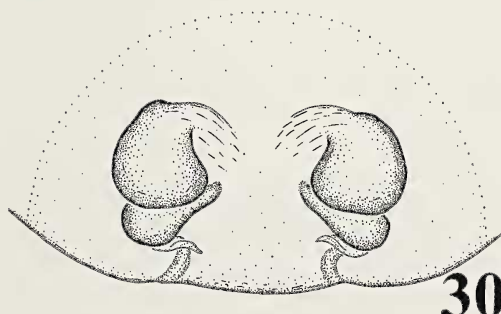
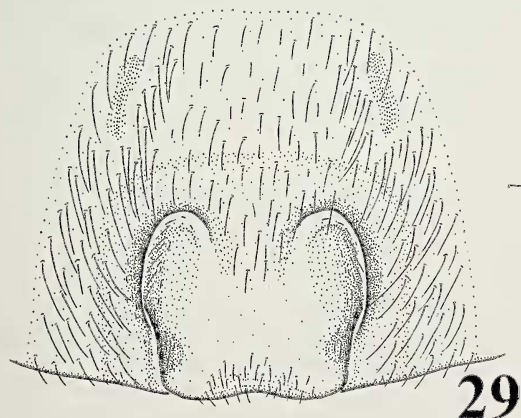
Psechrus sinensis Berland & Berland 1914
Figs. 24–28, Map 3

Psechrus sinensis Berland & Berland 1914: 131, figs. 1–3 (two male syntypes from Guiyang, Guizhou, China, in MNHN, examined). Lehtinen 1967: 261, fig. 474 (male) (incorrectly synonymized with *P. singaporensis*); Levi 1982: 123, figs. 34, 35 (male only, female is *P. taiwanensis* sp. nov.); Song, Zhu & Chen 1999: 397, figs. 232G–H, S (male and female).

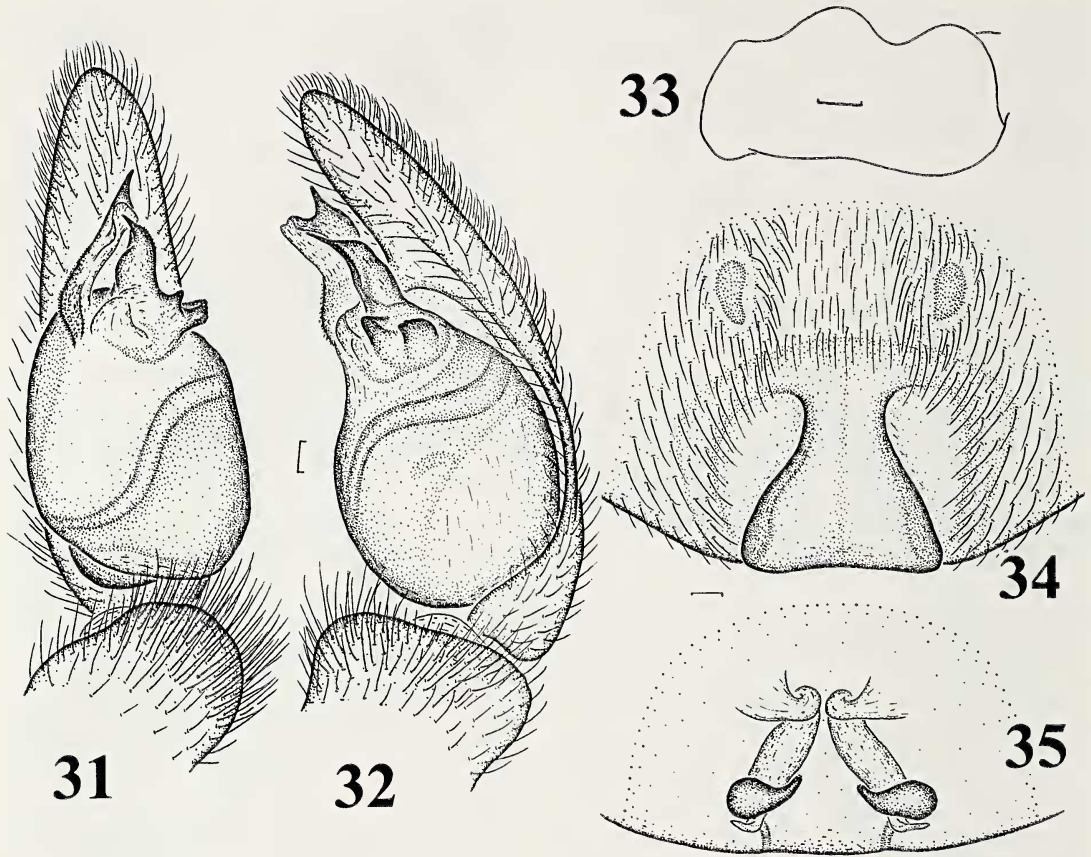
Psechrus guiyangensis Yin, Wang, & Zhang, 1985: 24, fig. 4(A–D) (female holotype and paratypes from Guiyang, Guizhou, China, in HBI, examined). First synonymized by Song, Zhu & Chen (1999).

Synonymy.—Study of *P. sinensis* male types and further collections of psechrids in China shows that *P. guiyangensis* is a junior synonym of *P. sinensis* (Song, Zhu & Chen 1999). As suspected by Levi (1982), the female (from Taiwan) illustrated as *P. sinensis* in Levi's (1982) paper is a new species *P. taiwanensis*, which will be described in this paper. Although Lehtinen (1967) listed *P. sinensis* as a junior synonym of *P. singaporensis*, this was not followed by later authors (Levi 1982; Platnick 1997; Platnick 2000). The species *P. sinensis* can be easily distinguished from *P. singaporensis* by the presence of white spot in front of cribellum, the strongly narrowed anterior part of epigynal median sclerite, the spermathecal shape, and the shape of conductor and embolic base.

Diagnosis.—This species is similar to *P. senoculata* but can be recognized by the ab-



Figures 29, 30.—*Psechrus taiwanensis* new species, female. 29. Epigynum; 30. Vulva.



Figures 31–35.—*Psechrus tingpingensis*. 31. Male palp, ventral view; 32. Male palp, retrolateral view; 33. Male palpal femur, showing femoral modification; 34. Epigynum; 35. Vulva.

sence of tubercles on the conductor base, the different shape of the rectangular embolic base (Figs. 24, 25), and the anteriorly narrowed median epigynal sclerite, and the narrowly separated copulatory ducts (Figs. 27, 28).

Male.—Described by Berland & Berland (1914) and Levi's (1982). White spot in front of cribellum present. Palpal femur modified with notch (Fig. 26); palpal bulb duct simply curved, slightly U-shaped; conductor short, lamella shaped; conductor base normal, not enlarged; embolus short, slender; embolus with toothed rectangular base (Figs. 24–26).

Female.—See Yin, Wang & Zhang's (1985) description of *P. guiyangensis*. White spot in front of cribellum present. Epigynal slits approach each other anteriorly; epigynal median sclerite wider posteriorly than anteriorly, with anterior part only about $\frac{1}{4}$ width of posterior part; copulatory ducts narrowly separated medially, with anterior and posterior

part moderately separated; spermathecal heads apparent, situated mesally on spermathecae; spermathecae rounded, widely separated (Figs. 27, 28).

Material examined.—CHINA: *Guizhou*: Guiyang (Kouy-Tcheou, Env. De Kouy-Yang), 1909 and 1913, 2 male syntypes (Le P. Cavalerie, MNHN); Guiyang, 30 September 1997, 1 female (X.P. Wang, AMNH); Guiyang, 4 July 1983, female holotype and 4 female paratypes of *P. guiyangensis* (Y.J. Zhang, HBI); Anshun, 2 July 1999, 2 females (X. Xu, HBI).

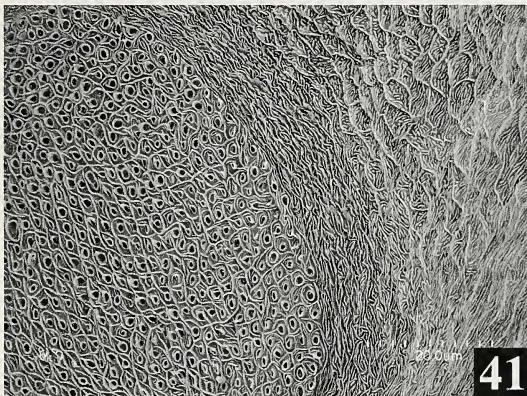
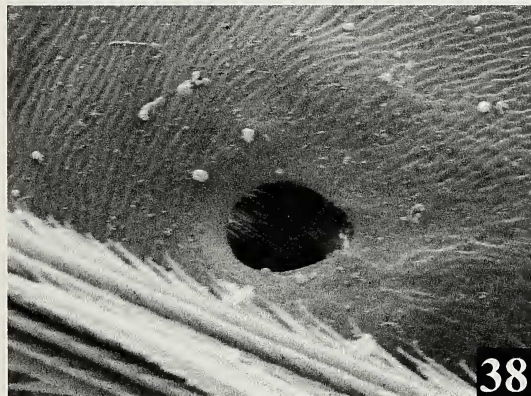
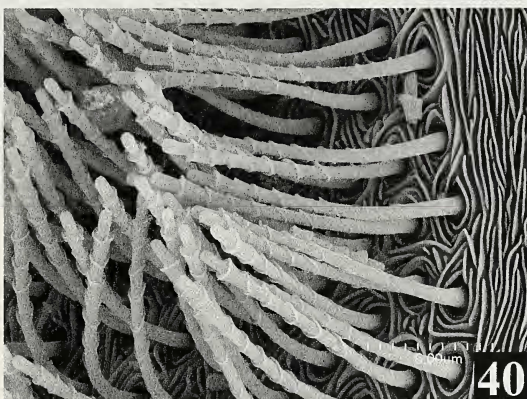
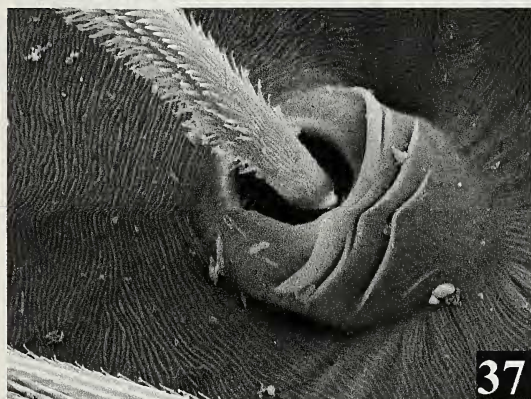
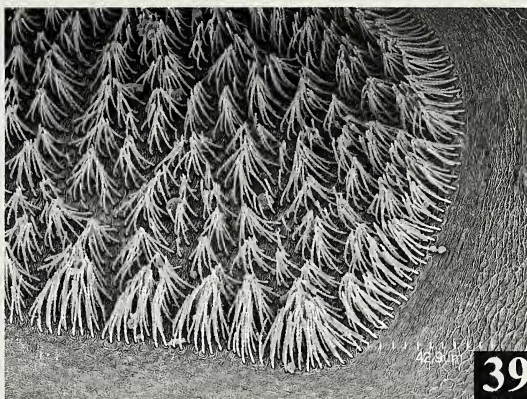
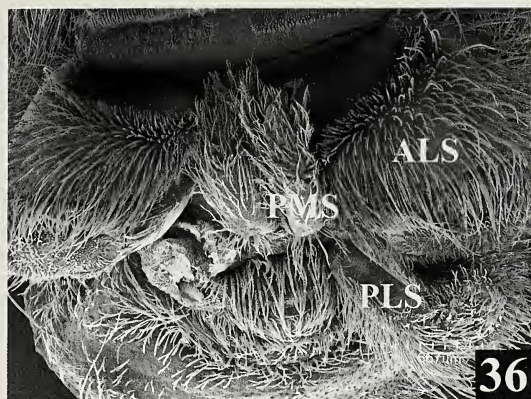
Distribution.—China (Guizhou) (Map 3).

Psechrus taiwanensis new species
Figs. 29, 30, Map 3

Type.—Female holotype from Taiwan (1894; Holst), deposited in BMNH, examined.

Etymology.—The specific name refers to the type locality.

Diagnosis.—This species is similar to *P. rani* new species, but can be distinguished by



Figures 36–41.—*Psechrus tingpingensis*. 36. Female spinnerets, ventral view, without left PLS; 37. Trichobothrium; 38. Tarsal organ; 39. Female cribellum; 40. Female cribellum, enlarged; 41. Male cribellum.

the depressed epigynal median sclerite, the posteriorly enlarged copulatory ducts, the small spermathecae of female (Figs. 29, 30).

Female.—For body measurements, see Levi's (1982) description of female *P. sinensis*. White spot in front of cribellum present. Epigynal slits more or less parallel; epigynal median sclerite depressed, with width slightly longer than length; copulatory ducts apparent, widely separated, enlarged posteriorly; sper-

mathecal heads apparent, situated mesally; spermathecae small, widely separated (Figs. 29, 30).

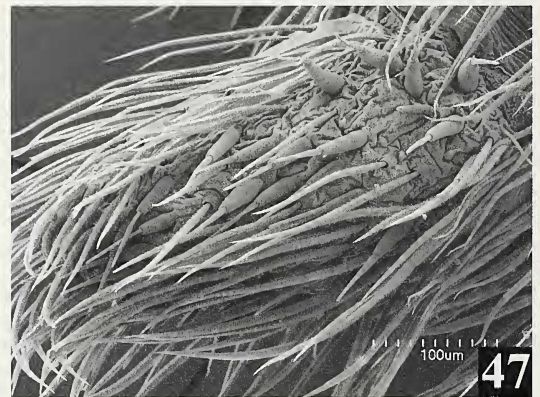
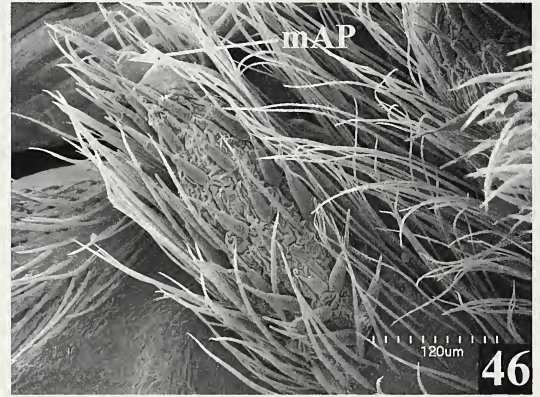
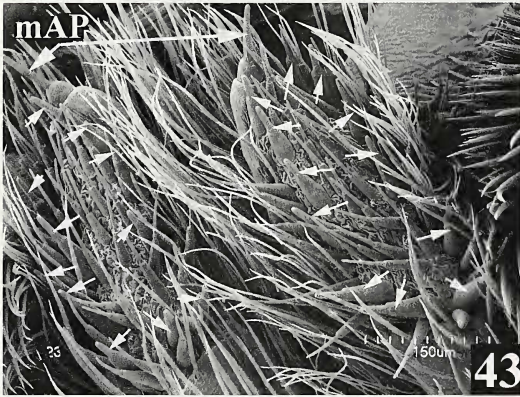
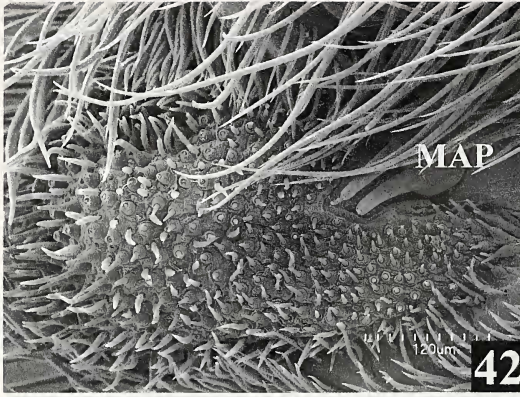
Male.—Unknown.

Other material examined. None.

Distribution.—China (Taiwan) (Map 3).

Psechrus tingpingensis Yin, Wang & Zhang
Figs. 31–47, Map 3

Psechrus tingpingensis Yin, Wang & Zhang 1985:
23, fig. 3 (female holotype and 2 female para-



Figures 42–47.—*Psechrus tingpingensis*, spinnerets, ventral view. 42. Female, ALS, left; 43. Female, PMS, both; 44. Female, PLS, left; 45. Male, ALS, left; 46. Male, PMS, left; 47. Male, PLS, left (short arrows refer to cylindrical spigots; MAP refers to major ampullate spigots and mAP refers to minor ampullate spigots).

types from Tingping, Chenbu, Hunan, China, in HBI, examined). Song, Zhu & Chen 1999: 397, figs. 232I-J (male and female).

Diagnosis.—The male of this species is similar to *P. sinensis* and *P. senoculata* in having a rectangular embolic base and modified femur (Fig. 33), but can be recognized by the slightly bifid conductor apex, and the pres-

ence of two apophyses on embolic base (Figs. 31–33). The female of this species is similar to *P. sinensis* but can be distinguished by the much wider anterior part of epigynal median sclerite, and the anteriorly spiral copulatory ducts (Figs. 34, 35).

Male.—Total length 16.0–18.0. One medium-sized specimen measured: Total length

18.0. Carapace 8.0 long, 4.5 wide. Abdomen 10.0 long, 4.0 wide. Leg measurements: I: 62.1 (17.0, 20.0, 17.5, 7.6); II: 46.0 (14.0, 15.0, 12.0, 5.0); III: 28.0 (9.0, 8.5, 6.5, 4.0); IV: 45.2 (13.0, 14.0, 12.0, 6.2). White spot in front of cribellum present. Palpal femur modified; palpal bulb duct U-shaped; conductor long, bifid, with dorsal apophysis sharp, highly sclerotized, ventral one broad, membranous; conductor base not enlarged, but with numerous small tubercles; embolus short, broad with sharp apex; embolic base broad, with two strongly sclerotized apophyses (Figs. 31, 32).

Female.—Described by Yin, Wang & Zhang (1985). White spot in front of cribellum present. Epigynal slits approaching each other anteriorly; epigynal median sclerite wider posteriorly than anteriorly, with anterior part about $\frac{1}{2}$ width of posterior part; copulatory ducts spiral anteriorly, widely separated posteriorly; spermathecal heads apparent, situated mesally; spermathecae rounded, widely separated (Figs. 34, 35).

Material examined.—**CHINA:** Hunan: Chengbu, Tingping, 31 July 1982, 1 female holotype and 2 female paratypes (J.F. Wang & Y.J. Zhang, HBI); Shimen, 25 June to 5 July 1992, 1 male and 2 females (X.J. Peng & L.P. Xie, HBI). Guangxi: Longsheng, 7 August 1982, 12 females (J.F. Wang & Y.J. Zhang, HBI); Ningming, May 1992, 1 male and 1 female (X. Pan, HBI); Ningming, 27 May 1997, 2 males and 2 females (Y.J. Zhang, HBI). **VIETNAM:** Hanoi: Tam Dao Mt. Forest Park, 2 May 1999, 2 males and 4 females (X.P. Wang, AMNH).

Distribution.—China (Hunan, Guangxi), Vietnam (Hanoi) (Map 3).

ACKNOWLEDGMENTS

We thank J. Margerison of the BMNH, C. Rollard of the MNHN, J.C. Ran of the Research Department, Maolan National Nature Reserve, Guizhou, China, and M.S. Zhu of the HTU for the loan of specimens, J. Chen of the IZB for depositary of some types. H.W. Levi of the Museum of Comparative Zoology at Harvard University and N.I. Platnick (AMNH) kindly helped review the manuscript. R. Baptista of the National Museum of Natural History, Smithsonian Institution, Washington, D.C. gave invaluable help. This research is in part based upon work supported by the National Science Foundation under

Grant No. 9870232 to the Center for Biodiversity and Conservation, AMNH, and the Institute of Ecology and Biological Resources, Hanoi, Vietnam. X.P. Wang was supported by the Schlinger Foundation Postdoctoral Fellowship in Systematic Entomology of the California Academy of Sciences.

LITERATURE CITED

- Berland, J. & L. Berland. 1914. Description d'un *Psechrus* nouveau de Chine. Bulletin de la Societe entomologique de France 83:131–133.
- Chamberlin, R.V. 1924. Descriptions of new American and Chinese spiders. Proceedings of the United States National Museum 63(13):1–38.
- Chen, S.H. 1996. A checklist of spiders in Taiwan. Annual of Taiwan Museum 39:123–155.
- Chen, X.E. & J.C. Gao. 1990. The Sichuan farmland spiders in China. Sichuan Science and Technology Publishing House, Chengdu, 226 pp.
- Chen, Z.F. & Z.H. Zhang. 1991. Fauna of Zhejiang: Araneida. Zhejiang Science and Technology Publishing House, 356 pp.
- Feng, Z.Q. 1990. Spiders of China in colour. Hunan Science and Technology Publishing House, 256 pp.
- Hu, J.L. 1984. The Chinese spiders from the fields and the forests. Tianjin Press of Science and Techniques, 482 pp.
- Lee, C.L. 1966. Spiders of Formosa (Taiwan). Taichung Junior Teachers College Publisher, 84 pp.
- Lehtinen, P.T. 1967. Classification of the cribellate spiders and some allied families, with notes on the evolution of the suborder Araneomorpha. Annales Zoologici Fennici 4:199–468.
- Levi, H.W. 1982. The spider genera *Psechrus* and *Fecenia* (Araneae, Psechridae). Pacific Insects, 24:114–138.
- Murphy, J. 1986. Additional information concerning the spider family Psechridae. Bulletin of the British Arachnological Society 7:183–185.
- Platnick, N.I. 1997. Advances In Spider Taxonomy 1992–1995, New York Entomological Society, 976 pp.
- Platnick, N.I. 2000. The World Spider Catalog. American Museum of Natural History Web Document.
- Pocock, R.I. 1900. Arachnida. Fauna of British India, Including Ceylon and Burma. London, 279 pp.
- Song, D.X. 1987. Spiders From Agricultural Regions Of China (Arachnida: Araneae). Agriculture Publishing House, Beijing, 376 pp.
- Song, D.X. 1988. A revision of the Chinese spiders described by Chamberlin. Sinozoologica 6:123–136.
- Song, D.X., M.S. Zhu & J. Chen. 1999. The Spiders Of China. Hebei Science and Technology Publishing House, Shijiazhuang, 640 pp.

- Thorell, T. 1881. Studi sur Ragni Malesi e Papuani III. Nel Museo Civico di Storia Naturale di Genova 17:1-720.
- Thorell, T. 1895. Descriptive Catalogue Of The Spiders Of Burma. British Museum, London, 406 pp.
- Thorell, T. 1897. Viaggio di Leonardi Fea in Birmania e regioni vicine. Nel Museo Civico di Storia Naturale di Genova 37:161-267.
- Wang, J.F. 1990. A new species of psechrid spider from China (Aeaneae: Psechridae). Natural Science Journal of Hunan Normal University 13: 257-258.
- Xu, Y.J. & L. Wang. 1983. A record of *Psechrus mimus* Chamberlin. Journal of Huizhou Teachers College 2:35-36.
- Yang, Z.L. & X.Z. Wang. 1993. A newly recorded of the spider genus *Fecenia* (Araneae: Psechridae) from China. Acta Arachnologica Sinica 2: 27-28.
- Yin, C.M., J.F. Wang & Y.J. Zhang. 1985. Study on the spider genera *Psechrus* from China. Journal of Hunan Teachers College (Natural Science Edition) 1:19-27.
- Zhu, C.D. 1983. A list of Chinese spiders (revised in 1983). Journal of Bethune Medical University 9 (supplement): 1-130.
- Zhang, Z.H., P.P. Yuan, F.P. Tong & Z.F. Chen. 1998. Study on fine structure of the two spider (Metathelae: Cribellatae). Journal of Hangzhou University 25(1):74-79.

Manuscript received 15 January 2000, revised 11 February 2001.